AMENDMENTS TO THE CLAIMS

Listing of claims:

This listing of claims replaces all prior versions of claims in the application.

~~WHAT IS CLAIMED IS:~~ CLAIMS

We claim:

1 (Currently Amended). A control operation device which receives a position feed-forward signal (xff), a torque feed-forward signal (tff), and a position detection value (xfb) of a controlled object, calculates ~~an operation amount~~ a manipulated variable so that the position detection value (xfb) coincides with the position feed-forward signal (xff), and outputs the ~~operation amount~~ manipulated variable, the control operation device, comprising:

an error signal calculation unit; and

an error compensation operation unit,

wherein the error signal calculation unit outputs a signal given by multiplying an error (err) given by subtracting the position detection value (xfb) from the position feed-forward signal (xff) by a gain α as an error command (err_ref), and outputs a signal given by changing a sign of the error (err) and multiplying a gain β as an error feedback value (err_fb), and

wherein the error compensation operation unit controls so that the error command (err_ref) and the error feedback value (err_fb) coincide, and outputs an error torque command value (err_tref), and adds the torque feed-forward signal (tff) and the error torque command value (err_tref) to give the ~~operation amount~~ manipulated variable (tref).

2 (Currently Amended). A control operation device comprising a speed control portion which receives a position feed-forward signal (xff), a speed feed-forward signal (vff), a torque feed-forward signal (tff), a position detection value (xfb) of a controlled object, and a speed

detection value (vfb) of the controlled object, calculates ~~an operation amount~~ a manipulated variable so that the position detection value (xfb) of the controlled object coincides with the position feed-forward signal (xff), and outputs the ~~operation amount~~ manipulated variable,

the control operation device, comprising:

an error signal calculation unit; and

an error compensation operation unit,

wherein the error signal calculation unit outputs a signal given by multiplying an error (err) given by subtracting the position detection value (xfb) from the position feed-forward signal (xff) by a gain (α) as an error command (err_ref), and outputs a signal given by changing a sign of the error (err) and multiplying a gain (β) as an error feedback value (err_fb), and

wherein the error compensation operation unit

controls so that the error command (err_ref) and the error feedback value (err_fb) coincides and outputs an error torque command value (err_tref),

inputs a signal (verr) given by subtracting a speed detection value (vfb) from the speed feed-forward signal (vff) into the speed control portion, and

adds the torque feed-forward signal (tff), a feedback torque command value (tfb) outputted from the speed control portion, and the error torque command value (err_tref) to give the ~~operation amount~~ manipulated variable (tref).

3 (Currently Amended). A control operation device comprising a speed control portion which receives a position feed-forward signal (xff), a speed feed-forward signal (vff), a torque feed-forward signal (tff), a position detection value (xfb) of a controlled object, and a speed detection value (vfb) of the controlled object, calculates ~~an operation amount~~ a manipulated variable so that the position detection value (xfb) of the controlled object coincides with the position feed-forward signal (xff), and outputs the ~~operation amount~~ manipulated variable,

the control operation device, comprising:

an error signal calculation unit; and

an error compensation operation unit,

wherein the error signal calculation unit outputs a signal given by multiplying an error (err) given by subtracting the position detection value (xfb) from the position feed-forward signal (xff) by a gain (α) as an error command (err_ref), and outputs a signal given by changing a sign of the error (err) and multiplying a gain (β) as an error feedback value (err_fb), and

wherein the error compensation operation unit

controls so that the error command (err_ref) and the error feedback value (err_fb) coincides and outputs an error speed command value (err_vref),

inputs a signal (verr) given by adding the speed feed-forward signal (vff) and the error speed command value (err_vref) and subtracting a speed detection value (vfb) therefrom into the speed control portion, and

adds the torque feed-forward signal (tff) and a feedback torque command value (tfb) outputted from the speed control portion to give the ~~operation amount~~ manipulated variable (tref).

4 (Currently Amended). A control operation device comprising a speed control portion which receives a position feed-forward signal (xff), a speed feed-forward signal (vff), a position detection value (xfb) of a controlled object, and a speed detection value (vfb) of the controlled object, calculates ~~an operation amount~~ a manipulated variable so that the position detection value (xfb) of the controlled object coincides with the position feed-forward signal (xff), and outputs the ~~operation amount~~ manipulated variable,

the control operation device, comprising:

an error signal calculation unit; and

an error compensation operation unit,

wherein the error signal calculation unit outputs a signal given by multiplying an error (err) given by subtracting the position detection value (xfb) from the position feed-forward signal

(xff) by a gain (α) as an error command (err_ref), and outputs a signal given by changing a sign of the error (err) and multiplying a gain (β) as an error feedback value (err_fb), and

wherein the error compensation operation unit

controls so that the error command (err_ref) and the error feedback value (err_fb) coincides and outputs an error speed command value (err_vref),

inputs a signal (verr) given by adding the speed feed-forward signal (vff) and the error speed command value (err_vref) and subtracting a speed detection value (vfb) therefrom into the speed control portion, and

gives a signal outputted from the speed control portion as the ~~operation amount~~ manipulated variable (tref).

5 (Original). The control operation device as recited in any one of claims 1 to 4, wherein the error compensation operation unit performs feed-forward control and feedback control.

6 (Original). The control operation device as recited in any one of claims 1 to 4, wherein the error compensation operation unit performs predictive control for determining a control input so that an evaluation function about a predicted value of a future error obtained by using a model of a controlled object and a control input are minimized, wherein the future error is a difference between the error command (err_ref) and the error feedback value (err_fb), and wherein the control input is given as an output of an error compensation operation unit.

7 (Currently Amended). The control operation device as recited in any one of claims 1 to ~~6~~ 4, ~~wherein~~ wherein a relation between the gain α and the gain β is expressed by a predetermined function, whereby when one of gain values is decided, the other is determined automatically.